

**SENATURK (Turkish Academy of Senology) – EURAMA (European Asian Society for Breast Disease)**

**FELLOWSHIP / CERTIFICATION PROGRAM FOR BREAST IMAGING**

**ADVANCED LEVEL**

**(For Radiology Specialists and Residents)**

**CURRICULUM**

**AIM** : This fellowship program offers advanced training in breast imaging and related interventional procedures. The ultimate goal of this fellowship program in breast imaging is for radiologists to be fully prepared to assume the role of lead interpreting physician in any breast imaging facility without the need for additional training.

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**PROGRAM** : SENATURK and EURAMA with collaboration of Marmara University School of Medicine and Marmara University Hospital offer a 1-year Fellowship / Certification Program for Breast Imaging.

Curriculum encompasses interpreting screening and diagnostic mammography, breast MRI as well as performing and interpreting diagnostic ultrasonography. Trainees will be exposed to following imaging modalities and breast related procedures:

- Screening mammography
- Diagnostic mammography
- Tomosynthesis
- Breast and axillary ultrasonography
- Breast MRI
- Imaging-guided biopsies, including stereotactic, ultrasound and MRI guided
- Preoperative wire localizations
- Fellows may also be exposed to and perform radio-guided occult lesion localization (ROLL)

As breast imaging is the heart for a multidisciplinary approach for breast care, the fellow will become proficient in patient interaction, as well as in interdisciplinary interaction with fellows of surgery, pathology, oncology and radiation oncology services. In addition to the intense clinical experience, fellows will be expected to participate in teaching and clinical research, journal clubs, seminars, as well as weekly multidisciplinary oncology board meetings, conferences and weekly radiology-pathology-surgery correlation conferences. Fellows will have the opportunity to attend national / international breast radiology meetings and courses in Turkey.

Research opportunities are available.

Recommended training period is one year but it is subject to revision according to the trainee's requirements and expectations. Six month-duration is the minimum requirement for full certification.

Program language is English (for non-Turkish speakers) and Turkish.

**EQUIPMENT** : Marmara University Hospital Breast Imaging Unit includes:

- Digital mammography and tomosynthesis
- Computer aided diagnosis (CAD) system
- Breast ultrasonography
- 1.5T and 3.0T MR units and dedicated breast coil and breast biopsy coil

- Prone Stereotactic Biopsy table
- Vacuum assisted as well as automated core biopsy devices and the ability to perform MRI guided biopsies.

**VENUE** : SENATURK- affiliated state and foundation university, state teaching and private hospitals.

**ELIGIBILITY** : Certified radiologists and residents in their final year of radiology residency are eligible for application.

**APPLICATIONS** : Application request should be sent to Prof. Erkin Aribal (earibal@marmara.edu.tr) along with following documents:

1. Completed application form (*To download please click*)
2. A recent photograph of the applicant
3. Curriculum vitae, including the applicant's e-mail address
4. Personal statement detailing the applicant's choice of a breast imaging fellowship program
5. Three (3) reference letters from faculty members or senior radiologists who may describe the applicant well

**ADVANCED BREAST IMAGING CURRICULUM:**

Minimum of 6 full-time equivalent months training; 12 months is recommended

By means of lectures, conferences, textbooks, syllabi, journal reprints, videotapes, teaching files, and other teaching materials, the fellow should become familiar with and understand the following topics in breast disease:

***Breast anatomy, physiology, and pathology***

- Breast development
- Normal breast anatomy and histology; alteration with age, pregnancy, menstrual cycle, and hormonal effects; male breast anatomy
- Pathologic appearance and clinical significance of:
  - Benign breast lesions
  - Atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), lobular carcinoma in situ (LCIS), and other histologic risk factors
  - Ductal carcinoma in situ (DCIS), including its histologic subtypes
  - Invasive ductal carcinoma not otherwise specified (NOS); subtypes of invasive ductal carcinoma (mucinous, medullary, papillary, tubular); invasive lobular carcinoma
  - Other types of breast cancer, such as Paget's disease and inflammatory carcinoma
  - Other malignancies involving the breast, including phyllodes tumor, lymphoma, leukemia, sarcomas, and metastases
- Histologic grading

- Pathologic staging
- Multifocal and multicentric carcinoma
- Margin analysis for specimens containing malignancy

### ***Epidemiology***

- Risk factors for breast cancer
  - Indications for genetic screening
- Breast cancer incidence and mortality, including longitudinal trends
- Breast cancer staging and survival rates by stage

### ***Mammographic equipment and technique***

- Both screen-film and full-field digital mammography
  - Features of dedicated mammographic units, including target, filtration, automatic exposure control (AEC), and grids
  - Factors affecting optical density, contrast, sharpness, and noise
  - Selection of technique factors, including effects of milliamp-seconds (mAs), kilovolt peak (kVp), target and filter material choice, and density settings on image quality and radiation dose
  - Effect of breast thickness and composition on technique, image quality, and radiation dose
  - Mammographic positioning for CC and MLO views
  - Mammographic positioning for women with breast implants
  - Rationale for breast compression
  - Clinical image assessment for proper breast positioning, compression, exposure, contrast, sharpness, and noise
- Screen-film mammography
  - Characteristics of mammographic screen-film systems
  - Film processing
  - Effect of screen-film speed, optical density, and film processing on radiation dose
  - High-intensity view boxes, view box masking
- Full-field digital mammography
  - Characteristics of full-field digital mammographic systems, including advantages and limitations
  - Effects of post-processing on the digital mammographic image
  - Effect of signal-to-noise ratio on radiation dose
  - Dedicated high-luminance, high-resolution viewing monitors

### ***Mammography quality assurance***

- Familiarity with content in the Mammography Quality Control
- Purpose and frequency of performance of quality control tests performed by the technologist and physicist

- Demonstrate proficiency in recognizing the mammographic appearance of artifacts for both screen-film and digital mammography
- Medical audit
  - Audit definitions as provided by BI-RADS
  - Desirable goals and benchmarks for standard outcome parameters, for both screening and diagnostic mammography
  - Auditing requirements for MQSA certification

### ***Mammographic interpretation***

- Optimal viewing conditions, including a low ambient light environment
- Demonstrate proficiency in:
  - Recognizing normal mammographic anatomy
  - Recognizing the mammographic features of characteristically benign and suspicious breast calcifications
  - Recognizing the mammographic features of characteristically benign and suspicious breast masses
  - Recognizing the mammographic appearance of indirect signs of malignancy (architectural distortion, asymmetries, etc)
  - Recognizing the mammographic features of the surgically altered breast, including implants
  - Recognizing the mammographic features of probably benign (BI-RADS category 3) lesions
- Principles, methods, strengths, and pitfalls of computer-aided detection (CAD) and double reading

### ***Screening mammography***

- Randomized clinical trials, case-control studies, service-screening studies: purpose, methods, results
- Pitfalls in evaluating screening results: lead-time bias, length-bias sampling, selection bias, prevalence versus incidence screening, interval cancer rate, survival rates
- Relative screening efficacy of clinical breast examination, breast self-examination, and mammography
- Benefit-risk assessment, including radiation risk and false positives
- Controversies regarding screening women aged 40-49 years; younger than age 40
  - Screening guidelines of different countries
- Logistics and throughput issues in the performance and interpretation of screening mammography examinations

### ***Diagnostic (problem-solving) mammography***

- Techniques and indications for and value of supplementary mammographic views
- Demonstrate proficiency in:

- Performing the work-up of lesions seen on only one standard (MLO or CC) screening view
- Three-dimensional lesion localization
- Correlation of palpable with imaging findings
- Evaluation and management of a palpable mass (or other focal symptoms) when there are no associated mammographic findings
- Assessment of extent of disease for suspicious and for known-malignant lesions

### ***Breast ultrasonography***

- Equipment and physical principles
- Techniques
- Indications
- Demonstrate proficiency in:
  - Recognizing normal sonographic anatomy
  - Recognizing features of simple cysts, complicated cysts, complex masses
  - Recognizing differential features of benign and malignant solid masses
  - Correlation with findings at mammography and clinical breast examination
- Limitations in the detection and assessment of microcalcifications
- Controversies regarding the role of screening whole-breast ultrasound examination

### ***Breast MRI***

- Equipment and physical principles
- Techniques
- Indications
- Strengths and limitations of kinetic and morphologic analysis
- Demonstrate proficiency in:
  - Recognizing normal MRI anatomy
  - Recognizing differential features of benign and malignant masses
  - Recognizing differential features of benign and malignant non-mass-like enhancement
  - Evaluating implant integrity
  - Correlation with findings at mammography, ultrasound, and clinical breast examination
- Limitations in the detection and assessment of lesions presenting as microcalcifications
- Controversies regarding the role of screening breast MRI examination

### ***Reporting and medico-legal aspects of breast imaging***

- Demonstrate proficiency in producing breast imaging reports, including:
  - ACR BI-RADS lexicon terms for mammography, ultrasound, and MRI
  - Lesion location

- Categorization of breast composition (BI-RADS breast density descriptors)
- Final assessment categories (ACR BI-RADS; MQSA regulatory requirements)
- Management recommendations
- Concordance between lesion descriptors and assessment categories
- Concordance between assessment categories and management recommendations
- Medicolegal aspects of all breast imaging and interventional procedures
  - Understanding the supervisory responsibility for approving the technical quality of a given examination
  - Communication issues and follow-up of abnormal findings
  - Informed consent for invasive procedures

### ***Interventional procedures***

- Principles, indications and contraindications, equipment, preparation, technique, advantages, disadvantages, accuracy, and auditing for:
  - Needle-wire localization guided by mammography and ultrasound
  - Ultrasound-guided core biopsy
  - Stereotactically guided core biopsy
  - Ultrasound-guided cyst aspiration
  - Targeted ultrasound to substitute ultrasound guidance for MRI guidance
  - MRI-guided core biopsy and needle-wire localization
  - Use and limitations of using markers to indicate the site of percutaneous biopsy
  - Specimen radiography,
- Assessment of imaging-pathologic concordance
- Post-procedure follow-up imaging

### ***Therapeutic and management considerations***

- Basic understanding of breast cancer treatment options
- Role of breast imaging in planning and monitoring of breast cancer treatment and post-treatment follow-up
  - Role of breast imaging in management of Ductal Carcinoma In-Situ of the breast (DCIS)
  - Role of breast imaging in Breast Conservation Therapy in the Management of Invasive Breast Carcinoma (3)
- Strategies to improve the profitability

### ***Other***

- Active participation in screening and diagnostic mammography interpretation
- Active participation in breast MRI interpretation
- Formal teaching conferences (lectures, case presentations)

- Imaging-pathologic correlation conferences; multidisciplinary breast cancer case conferences
- Direct observation or videotape of mammographic positioning for routine and supplementary views
- Breast imaging textbooks
- Demonstrate proficiency in interacting with patients, including how to recommend biopsy, how to explain a cancer diagnosis, and how to develop sensitivity to patients' emotional needs
- Experience interacting with surgeons, pathologists, medical oncologists, and radiation oncologists in providing multidisciplinary patient care
- Familiarity with radionuclide breast scanning
- Familiarity with performing a medical audit
- Teaching medical students and residents
- Encourage participation in research projects
- Familiarity with performing breast positioning and setting techniques for mammographic examination
- Knowledge of quality control tests performed by medical physicist
- Observation of pathology, breast surgery, and radiation therapy practice

***Minimum Requirements:***

Must attend (observe)

2500	Mammography interpreting
500	Breast US examination
100	Breast MR interpreting
30	Fine Needle Aspiration, core needle and Vacuum Assisted Biopsy
5	Stereotaxic biopsy
5	Wire localisation
20	Difficult case consultations
100	Breast & Regional Lymph Node Basin Physical examination
30	Multidisciplinary Cancer Meeting (Board)
2	Mastectomy
2	Axillary dissection
2	Sentinel lymph node biopsy
2	Lumpectomy
1	Skin sparing mastectomy
1	Breast reconstruction (one with prosthesis, one with autologues flaps)
25	Breast surgery outpatient clinics
10	Oncology outpatient clinics



10 Radiation Oncology outpatient clinics

2 Genetic counselling

### **Assessment Tools**

- Written MCQ exam
- Log book
- Direct Observation of Procedural Skills (DOPS)
- Case-based Discussions (CbD)
- Procedure-Based Assessments (PBA)
- Professionalism Mini-Evaluation Exercises (P-MEX)
- Portfolio